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ASYMPTOMATIC INTESTINAL MICROSPORIDIOSIS IN A HUMAN IMMUNODEFICIENCY VIRUS- SERONEGATIVE, IMMUNOCOMPETENT ZAMBIAN CHILD

In recent years there has been increasing attention to microsporidial infection in humans. Microsporidia are obligate intracellular protozoan parasites that infect a wide variety of lower animals. Four genera (*Enterocytozoon*, *Encephalitozoon*, *Pleistophora* and *Nosema*) have been identified in human microsporidiosis.¹ Most symptomatic infections are found in immunocompromised patients.² This concerns

mainly HIV-infected persons, in whom microsporidia are a frequent cause of diarrhea, biliary illness and occasionally systemic infection.

Various studies have been carried out in Africa investigating intestinal microsporidial infection in children. In a group of 106 children in Harare (Zimbabwe) with symptoms of persistent diarrhea, of whom 18 were confirmed to be HIV-seropositive, *Enterocytozoon bienewisi* infection could not be detected in any of the fecal samples.³ A study in Niger showed 8 of 990 children to have intestinal *E. bienewisi* infection, from which 6 were reported to have diarrhea.⁴ A study in Kilifi (Kenya) showed no intestinal microsporidial infection in a group of 16 marasmic children and 32 children with kwashiorkor; a total of 5 children in this study were HIV-seropositive (RW Sauerwein, unpublished results).

In immunocompetent persons microsporidiosis is limited to case reports and includes four patients with corneal stroma infection, of which two were caused by *Nosema* and two were of undetermined *Microsporidium* species.⁵ *E. bienewisi* infection in an immunocompetent adult has been reported by Sandfort et al.⁶; this was an HIV-seronegative adult with acute, self-limited traveller's diarrhea, whose CD4⁺ cell count and plasma immunoglobulin values were normal. A case of self-limited traveller's diarrhea in an immunocompetent HIV-seronegative child with intestinal infection with *E. bienewisi* and *Cryptosporidium parvum* was recently presented by Sobottka et al.⁷ We report a case of asymptomatic intestinal *E. bienewisi* infection in a HIV-seronegative, immunocompetent Zambian child.

Methods and case report. In a population-based survey conducted in Samfya District, Zambia, in 1994, we examined stool samples from 176 rural children for microsporidia. Before entrance in the study informed consent was obtained from the parents or guardians of these children. Single fresh stool samples were collected and stored for 1 to 8 weeks at 4°C with 100 µl of 0.01% azide, before examination. The samples were examined for spores of microsporidia using the Uvitex 2B® fluorescence method.⁸ Serum samples were collected to examine serologic HIV status.

One of 176 stool samples contained spores of *E. bienewisi*, as confirmed by electron microscopy. The child was a 7-month-old 8.0-kg boy in good nutritional status. The mother reported that the boy had no history of diarrhea in the previous 2 weeks. At the Tropical Diseases Research Centre in Ndola-Zambia, three more stool samples were routinely examined for ova and cysts, including Ziehl-Neelsen stain for oocysts of *Cryptosporidium*, all with negative results. Laboratory investigations showed normal results, with a hemoglobin of 8.5 g/dl and serum concentrations of albumin and C-reactive protein of 44 g/l and 5 mg/l, respectively. The child was HIV-seronegative (HIV1/HIV2 Cambridge Biotech Recombigen ELISA® and HIV1/HIV2 IMX® test from Abbott), and serum immunoglobulin concentrations (IgG 11.32 g/l, IgM 2.06 g/l and IgA 0.45 g/l) showed no indication of immunodeficiency. In the total study group of 176 children, only 1 subject was HIV-positive.

Nine months later another stool sample was obtained from this child that was negative for spores of microsporidia. By that time the boy was 16 months old and still in a good nutritional status (body weight, 9.7 kg). The mother gave no history of frequent or longstanding diarrhea in her child since the previous visit. Recently when the child reached the age of 2 years and 4 months, plasma was collected and again found to be HIV-negative (HIV1/HIV2 Cambridge Biotech Recombigen ELISA®).

Discussion. Based on its relatively high prevalence in HIV-positive persons, it has been suggested that *E. bienewisi*

may be a natural parasite of humans that is missed in routine stool examination, and clinically manifest only in severely immunocompromised people.¹ However, in one study the prevalence of intestinal microsporidia was not significantly different between HIV-infected persons with or without diarrhea.⁹ We report intestinal *E. bienersi* infection in the absence of clinical symptoms in an HIV-seronegative, immunocompetent child. Thus carriage of *E. bienersi* has been demonstrated to occur in HIV-infected individuals, but importantly our study shows that carriage of *E. bienersi* can also occur in asymptomatic immunocompetent individuals.

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MUMPS INFECTION COMPLICATED BY TRANSIENT HYPERINSULINEMIC HYPOGLYCEMIA

Mumps is a viral infection usually characterized by the development of parotitis. Several complications have been reported in the literature, including orchitis, oophoritis, mastitis,¹ meningoencephalitis,² deafness,³ arthritis,⁴ nephritis⁵ and diabetes mellitus.⁶ It has been postulated that mumps virus has a tropism for the pancreas that produces injury to the islet cells resulting in diabetes.^{6,7} However, to our knowledge hyperinsulinemic hypoglycemia has not been documented in patients with mumps. We describe a case and speculation regarding the possible pathophysiology.

Case report. An 11-year-old girl was brought to our hospital because of sudden development of dizziness, headache, cold sweating and drowsiness. She had had mild fever and painful swelling of the right parotid gland for 3 days before admission. The initial blood glucose value was 35 mg/dl and the serum amylase was 534 IU/l. Cerebrospinal fluid examination showed a white blood cell count of 3/mm³ which were all lymphocytes, a protein concentration of 65 mg/dl and a glucose value of 25 mg/dl. She recovered consciousness within seconds after intravenous infusion of 10% glucose-water, and her blood glucose concentration was maintained between 60 and 95 mg/dl. On the next day after discontinuing the glucose infusion for 3 h, lethargy developed and the blood glucose value was 34 mg/dl with a serum insulin concentration of 19.9 µIU/ml (normal <10 µIU/ml; for sugar <50 mg/dl). The diagnosis of mumps was proved by a positive mumps IgM antibody (enzyme-linked immunosorbent assay, Medac) and 1:16 complement-fixing antibodies to both the S and V antigens (BioWhittaker). Mumps infection associated with hyperinsulinemic hypoglycemia was considered the most likely diagnosis. Attempts to discontinue the glucose infusion failed for the next 3 days because of the appearance of drowsiness, after which the infusions were stopped. Two weeks after the episode after an overnight fast for 9 h, the blood glucose level was 65 mg/dl and the serum insulin value was 0.32 µIU/ml. She has been followed for 4 years without recurrence of hypoglycemia or evidence of diabetes. Her family refused further check of the mumps titers.

Discussion. The most common clinical presentations of mumps infection in children are fever and painful parotid swelling. Several complications have been reported, including orchitis, oophoritis, mastitis,¹ meningoencephalitis,² deafness,³ nephritis⁵ and arthritis.⁴ Rarely fatal cases have been reported,⁸ usually with late complications such as nephritis⁹ and central nervous system infection.¹⁰ Diabetes mellitus after mumps was documented in 1834 by Strang (see Hinden¹¹). Fatal diabetes occurred in an infant whose mother developed mumps at the time of delivery. At autopsy signs of chronic pancreatitis were found,⁷ which could explain the cause of diabetes.

Our patient developed transient hyperinsulinemic hypoglycemia, which to our knowledge has not been previously documented in a patient with mumps. Two explanations, tropism of the mumps virus for the pancreas and a limited increase of serum interleukin-1, are possible. Tropism for the pancreas has been postulated as the cause of diabetes mellitus following mumps.^{6,7} It was possible that our patient developed a limited degree of islet cell destruction, which caused an acute and transient surge of insulin. Because damage to the islet cells was limited, diabetes mellitus did not develop.

Interleukin-1, a proinflammatory mediator, can induce hypoglycemia in three ways. The first is its anorectic effect.¹² The second is increased synthesis of glucose transporters, thus increasing intracellular glucose concentration.¹³ Finally